WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: MN281

Title: Photochemical fate of pharmaceutical compounds discharged and detected in natural waters

Focus Categories: Non Point Pollution, Waste Water

Keywords: humics, nitrate, indirect photolysis, direct photolysis

Start Date: 09/01/2001

End Date: 08/31/2003

Federal Funds Requested: $102,656

Non-Federal Matching Funds Requested: $103,708

Congressional District: Minnesota Fifth

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Abstract

Recent studies have demonstrated that many pharmaceuticals and personal care products (PPCPs) are incompletely removed in wastewater treatment systems. As a result, wastewater treatment plants serve as continuous sources of PPCPs into surface waters. Although PPCPs have been detected in surface, ground, and drinking waters, little information is available regarding their fate in aquatic systems. The goal of this study is to determine the importance of photolysis as a degradation mechanism for PPCPs in surface waters. The specific objectives are (1) to measure the rates of direct photolysis of a selected group of PPCPs, (2) to measure the rates of indirect photolysis mediated by hydroxyl radical and singlet oxygen, and (3) to use the experimentally determined rate constants to assess the importance of these processes in natural waters. The products of the photolysis of the PPCPs will also be identified. The list of target PPCPs will be continuously updated through an ongoing dialogue with researchers in the U.S. Geological Survey. Photolysis studies will be conducted in the laboratory using both simulated and natural sunlight. The investigation also will use natural waters collected from a variety of locations in Minnesota to determine the dominant photodegradation mechanism in these systems. The results of this work will lead to an increased understanding of the lifetime of PPCPs in surface waters and will also aid in evaluating the risks that the discharge of PPCPs poses to human health and sensitive ecosystems.